

March 8, 2011

Ms. Marlene Dortch
Secretary
Federal Communications Commission
445 Twelfth Street, SW
Washington DC, 20554

RE: Ex Parte Communications Unlicensed Operations in the TV Broadcast Band
ET Docket No: 04-186

Dear Ms. Dortch:

On January 4, 2011 Adaptrum demonstrated to the FCC/OET staff a fully functional TVBD system lacking only the database capability in the absence of an approved TV bands database.¹ During the meeting, the TVBD emission mask requirement was discussed and Adaptrum provided a measured TVBD transmit signal spectrum.² Along with this letter, Adaptrum is submitting a report of the adjacent channel emission mask compliance test conducted by Compliance Certification Services (UL CCS). We hope this test report will serve as a reference to help the Commission establish proper TVBD emission measurement procedures. We are also submitting some EIRP measurement data for informational purposes only to demonstrate the power levels that can be achieved in a practical TVBD system.

Based in Fremont, CA, UL CCS is a well respected independent test lab accredited by NVLAP, Laboratory Code 200065-0. They have well established test procedures and routinely test equipment for compliance with FCC emission limits.

The adjacent channel emission measurement was performed on an Adaptrum TVBD unit over three TV channels centered at 473 MHz, 605 MHz, and 695 MHz respectively. Adaptrum TVBD system supports programmable signal bandwidth and the transmit signal bandwidth of the TVBD is programmed to be 5.65 MHz. As discussed in the report, the measured 99 percent power bandwidth was approximately 5.55 MHz and the -20 dB power bandwidth was approximately 5.75 MHz. The conducted average output power from the TVBD was approximately 29 dBm. On all three channels, the TVBD met the adjacent channel emission requirement that on both edges of the 6 MHz channel, the average signal power over 100 kHz bandwidth is 72.8 dB lower than the total inband power over the 6 MHz channel.

Note that the TVBD was programmed to maximize the signal bandwidth while satisfying the emission requirement. Additional out-of-band emission (OOBE) margin can be provided by reducing the signal bandwidth, e.g. by 50 kHz on each side the signal spectrum. Also note that spectrum analyzer dynamic range will ultimately limit

¹ *Ex parte* presentation, Adaptrum, Inc., Docket 04-186, January 4, 2011
(<http://fjallfoss.fcc.gov/ecfs/document/view?id=7021025256>)

² Attachment to *ex parte* presentation
(<http://fjallfoss.fcc.gov/ecfs/document/view?id=7021025257>)

measurement accuracy. As discussed in the report, under the current measurement setup, the measured system noise floor is approximately 10 to 11 dB below the measured emission level on the channel edge (in the 473 MHz measurement). This system noise floor will cause slight increase in the estimated emission level. Furthermore, emission levels approaching the system noise floor cannot be accurately measured by the measurement system.

The EIRP measurement was performed on a system where the TVBD is connected to a wideband sector antenna with approximately 15 dBi gain. The measured Azimuth pattern shows the system can deliver up to 45 dBm EIRP level within a 60 degree sector. We emphasize that the EIRP data is informational only. The setup is not intended to demonstrate rule compliance. To satisfy the 36 dBm EIRP requirement specified in the rules, the conducted output power from the TVBD needs to be reduced from 29 dBm to around 20 dBm.

There are a few recent filings and petitions regarding the TVBD OOB limits. Motorola stated that the §15.709 OOB limits “far exceed industry standards for IEEE 802.11 and IEEE 802.16 compliant technologies.”³ We agree. However, TV Band Device is a new class of equipment authorized in a licensed band and operating in ways that are very different from the bands and operations 802.11 and 802.16 were designed and adopted for years ago. We believe the Commission is correct in taking cautious steps with the OOB limits to ensure the introduction of this new class of equipment will not cause disruption to the existing licensed services in the TV bands. We recall that during the Phase I of the FCC TV Band Device Testing, one of the two devices did down-convert a WiFi signal to the TV band and caused significant adjacent channel interference when no external filtering was applied.⁴

Some parties have argued that meeting the current OOB limits is not practical or prohibitively expensive.⁵ We disagree. In fact, other than advanced signal processing, Adaptrum TVBD is built entirely with widely available commercial RF, analog and digital components and we are currently developing low-cost TVBD chipsets for mass market adoption. It may be inconvenient for some manufacturers who want to take older technologies like 802.11 or 802.16 and directly apply them to the TV whitespace with few modifications. But there are no insurmountable technical and cost barriers in this case.

³ Motorola Petition at 2

⁴ “Initial Evaluation of the Performance of Prototype TV-Band White Space Devices,” OET Report FCC/OET 07-TR-1006, July 31, 2007 (http://hraunfoss.fcc.gov/edocs_public/attachmatch/DOC-275666A1.pdf)

⁵ Petition for Reconsideration, Motorola Solutions, Inc., ET Docket Nos. 04-186, 02-380 (Jan. 5, 2011) (“Motorola Petition”); Joint Petition for Partial Reconsideration, Wireless Internet Service Providers Association, the Federation of Internet Solution Providers of the Americas, the Native American Broadband Association, Spectrum Bridge, Inc., Comsearch, Carlson Wireless Technologies Inc., and Wireless Strategies, Inc., ET Docket Nos. 04-186, 02-380 (Jan. 5, 2011) (“Joint Petition”); Petition for Reconsideration, Wi-Fi Alliance, ET Docket Nos. 04-186, 02-380 (Jan. 4, 2011) (“Wi-Fi Alliance Petition”).

Innovation and the free market will drive down the cost of TVBD solutions rapidly and once the TVBDs reach the mainstream market they will be cost competitive to existing solutions based on technologies like 802.11 or Cellular 3G.

We believe the Commission had sound reasoning in adopting the current OOB limits⁶ and reopening this issue at this late stage because certain manufacturers cannot achieve it technically or cost wise is not justified. Furthermore, we believe a related issue is far more important to be considered, i.e. allowing fixed operation in adjacent channels, which we urged the Commission to consider in our petition for reconsideration.⁷

In a recent Part 5 STA application for TVBD operation in Orlando, FL, we noticed that while there are close to 10 whitespace channels available in the area between channels 20 to 51, *none* of them can be used by fixed TVBDs because of the adjacent channel restriction. Such situation is common-place in most other areas in this country and *outdoor wide-area deployments are impossible without fixed TVBDs*. We urge the Commission to revisit this issue when real-world experience and evidence are gained through commercial deployments of TVBD systems and networks.

Sincerely,

/S/

Haiyun Tang, Ph. D.
Adaptrum, Inc.

cc:

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⁶ 2nd Memorandum Opinion and Order, Docket 04-186, September 23, 2010 (http://fjallfoss.fcc.gov/edocs_public/attachmatch/FCC-10-174A1.pdf) where the -55 dBc adjacent channel emission limit was initially proposed by the White Space Coalition; TV White Space Phase II Test Report, October 15, 2008

(http://hraunfoss.fcc.gov/edocs_public/attachmatch/DA-08-2243A3.pdf)

⁷ Petition for Reconsideration of Adaptrum, Inc., Docket 04-186, March 20, 2009 (<http://fjallfoss.fcc.gov/ecfs/document/view?id=6520202069>)